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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/081,796	02/22/2002	Dean J. Denning	SC91135A D01	1748

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MOTOROLA INC
AUSTIN INTELLECTUAL PROPERTY
LAW SECTION
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EXAMINER	
MCDONALD, RODNEY GLENN	
ART UNIT	**PAPER NUMBER**
1753	

DATE MAILED: 04/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/081,796	DENNING ET AL.	
	Examiner	Art Unit	
	Rodney G. McDonald	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 February 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *33-37 and 45-57* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *33-37 and 45-57* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 48-53, 56 and 57 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically the isolation ring having a top portion exposed to an environment of the sputtering chamber coated with a conductive material and having a ***bottom portion*** for contacting with the wafer and isolating the wafer from portions of the sputtering chamber is not discussed in the specification.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 33, 34, 37, 45, 46, 48, 49 and 54-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al. (U.S. Pat. 5,271,788) (Evidence document Yamagami et al. (U.S. Pat. 5,316,645))

Hasegawa et al. teach that conventionally, a dry etching apparatus, ***a thin-film forming apparatus and the like for use in manufacture of semiconductor elements are known as a magnetron plasma processing apparatus.*** In this apparatus, plasma is generated in a process chamber of the apparatus to perform a desired operation such as etching and ***thin-film formation***, by the action of ions, radicals, electrons, etc. contained in the plasma. (Column 1 lines 11-19)

Problems are associated with magnetron plasma etching apparatus, ***magnetron plasma sputtering apparatus***, plasma CVD apparatus and the like which include low cycloid movement of electrons near the periphery, the density of electrons increases on the periphery of the wafer which damages the wafer and the ion density is increased in a region near the periphery of the wafer more than in a region above the near central part of wafer. (Column 1 lines 59-68; Column 2 lines 1-27)

FIG. 8 shows an enlarged part of the apparatus shown in FIG. 7. As is apparent from FIG. 8, the second embodiment differs from the first embodiment in that ***the***

conductive ring 22 is arranged on an insulating ring 32C. The insulating ring 32C has an outer diameter which is substantially the same as that of the support wall 32b of the lower chamber portion 32 and an inner diameter which is substantially the same as that of the ceramic insulation member 16. (Column 7 lines 56-64)

The conductive ring 22 electrically contacts the suscepter 12 and is insulated from the lower chamber portion, as in the first embodiment. The ring 22 is formed of material whose electrical resistance is lower than that of an object to be processed. For example, nonmetallic SiC, carbon, and the like can be used for the silicon wafer 10. The outer diameter of the ring 22 is larger than the diameter of the first suscepter 12 and that of the wafer 10. Consequently, the same advantage as that of the first embodiment can be obtained from the second embodiment. (Column 65-68; Column 8 lines 1-7)

The conductive ring 22 is formed of carbon in the above embodiments, but can be formed of other conductive material such as SiC and Al. Since, however, the conductive ring 22 is formed to prevent electrons from being injected from plasma into the wafer 10, it is desirable that the electrical resistance of the ring 22 be lower than that of the wafer 10. The conductive ring 22 can be changed to another one having an electrical resistance suitable for that of the wafer 10. (Column 10 lines 32-40)

Further, only the surface of the ring 22 can be formed of the conductive material. In other words, a ring formed of insulating material on the surface of which a conductive film is formed, can be used as a conductive ring. In the present invention, such a ring is also referred to as a conductive ring. In this case,

however, the surface of the ring has to electrically contact a suscepter 14. (Column 10 lines 41-48)

A wafer formed of polysilicon, monocrystalline silicon, amorphous silicon, or the like can be used as a substrate or an object to be processed. (Column 49-52)

The present invention is not always applied to the magnetron plasma etching apparatus but can be applied to another magnetron plasma processing apparatus such as a plasma CVD apparatus. (Column 10 lines 54-57)

As seen in Fig. 3 the pedestal is biased to a first power with RF source and the second region of the chamber is grounded. (See Fig. 3)

Inherently the chamber of Fig. 3 could be utilized for plasma CVD depending on the selection of gases utilized. Hasegawa et al. recognize that magnetron plasma CVD is possible. (See Column 10 lines 54-57; Column 1 lines 10-19)

Inherently the sputtering apparatus includes a target for deposition of a film layer. Hasegawa et al. recognizes magnetron plasma sputtering apparatus and film formation. (Column 1 lines 10-19; Column 2 lines 23-27) (Yamagami et al. is evidence of a conventional magnetron plasma sputtering apparatus. In Figure 7 for instance a magnetron target for a magnetron plasma sputtering apparatus is shown)

The differences between Hasegawa et al. and the present claim is that the tuning of the film is not discussed and the where the film is a barrier layer of tantalum or tantalum containing material.

Chiang et al. that residual stress in a tantalum or tantalum nitride film can be controlled (tuned) by controlling particular process variables during film deposition. By

tuning individual film stresses within a film stack, it is possible to balance stress with the stack. By tuning individual film stresses within a film stack, it is possible to balance stresses within the stack. Process variables of particular interest include: power to the sputtering target; process chamber pressure, substrate DC offset bias voltage; power to the ionization source (typically a coil); and temperature of the substrate. (See Abstract) The most advantageous tuning of a sputtered film is achieved using a high density plasma deposition. When the tantalum or tantalum nitride film is deposited using high density plasma sputtering, power to the ionization source can be varied for stress tuning of the film. (See Abstract)

When IMP-sputtered tantalum film was produced, a high density, inductively coupled RF plasma was generated in the region between the target cathode and the substrate. (Column 6 lines 44-49)

The tantalum or tantalum containing film is used as a barrier layer. (Column 2 lines 13-17)

The motivation for utilizing control of power to the target, coil or control of bias to the substrate is that it allows for tuning individual stresses in the film. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Hasegawa et al. by utilizing control of power to the target, coil or control of bias to the substrate as taught by Chiang et al. because it allows for tuning individual stresses in the film.

Claims 35 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al. (U.S. Pat. 5,271,788) (Evidence document Yamagami et al. (U.S.

Pat. 5,316,645)) in view of Chiang et al. (U.S. Pat. 6,139,699) and further in view of Armstrong et al. (U.S. Pat. 5,482,612).

Hasegawa et al. in view of Chiang et al. is discussed above and all is as applies above. (See Hasegawa et al. in view of Chiang et al. discussed above)

The difference not yet discussed is providing the Al coating on the insulating ring by flame spraying is not discussed.

Armstrong et al. teach flame-spraying aluminum on components in a sputtering chamber in order to extend the lifetime of the components. (Column 4 lines 14-31)

The motivation for flame spraying the Al coating is that it allows for extending the lifetime of the component in the sputtering chamber. (Column 4 lines 14-31)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Hasegawa et al. by flame spraying aluminum on components in a sputtering chamber as taught by Armstrong et al. because it allows for extending the lifetime of the component in the sputtering chamber.

Claims 36, 52 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al. (U.S. Pat. 5,271,788) (Evidence document Yamagami et al. (U.S. Pat. 5,316,645)) in view of Chiang et al. (U.S. Pat. 6,139,699) and further in view of Douglas (U.S. Pat. 4,999,320).

Hasegawa et al. in view of Chiang et al. is discussed above and all is as applies above. (See Hasegawa et al. in view of Chiang et al. discussed above)

The difference not yet discussed is that where the insulating ring is a ceramic or dielectric is not discussed.

Douglas teach a cathode 16 with a conductor 46 having an insulating rim 48 coated with a grounded conductor 50. Insulated rim 48 may comprise, for example, Teflon or ***ceramic (A ceramic is inherently a dielectric)***, while conductive layer 46 may comprise, for example, aluminum. (Column 3 lines 56-66)

The motivation for utilizing a ceramic (i.e. dielectric) is that it allows for suppressing ionization avalanches. (Column 2 lines 38-42)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Hasegawa et al. by utilizing a ceramic (i.e. a dielectric) as taught by Douglas because it allows for suppressing ionization avalanches.

Claims 47 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al. (U.S. Pat. 5,271,788) (Evidence document Yamagami et al. (U.S. Pat. 5,316,645)) in view of Chiang et al. (U.S. Pat. 6,139,699) and further in view of Moslehi (U.S. Pat. 6,132,805).

The difference not yet discussed is that arc spraying is not discussed.

Moslehi teaches arc spraying a chamber component to reduce particle generation and extend lifetime. (Column 7 lines 15-20)

The motivation for arc spraying is that it allows for reducing particle generation and extending lifetime. (Column 7 lines 15-20)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Hasegawa et al. by utilizing arc spraying

of chamber components as taught by Moslehi because it allows for reducing particle generation and extending lifetime.

Response to Arguments

Applicant's arguments filed February 4, 2004 have been fully considered but they are not persuasive.

In response to the argument that the references of record do not teach tuning the film utilizing a bias waveform of a coil, it is argued that newly cited Chiang et al. required by Applicant's amendment suggests tuning the film by utilizing a waveform to a RF coil in a chamber. Hasegawa et al. suggest the isolation ring that should be used in a sputtering apparatus.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
April 6, 2004